

**CITY OF LODI
INFORMAL INFORMATIONAL MEETING
"SHIRTSLEEVE" SESSION
CARNEGIE FORUM, 305 WEST PINE STREET
TUESDAY, OCTOBER 3, 2006**

An Informal Informational Meeting ("Shirtsleeve" Session) of the Lodi City Council was held Tuesday, October 3, 2006, commencing at 7:02 a.m.

A. ROLL CALL

Present: Council Members – Beckman (left at 8:01 a.m.), Hansen, Johnson, Mounce, and Mayor Hitchcock (arrived at 7:05 p.m.)

Absent: Council Members – None

Also Present: City Manager King, City Attorney Schwabauer, and Interim City Clerk Perrin

B. TOPIC(S)

B-1 "White Slough Water Pollution Control Facility Groundwater Report and Improvement Project update"

Public Works Director Prima reported that this groundwater report is the first analysis of groundwater conditions at the White Slough Water Pollution Control Facility and the surrounding area. There is also a major salinity study being conducted by the United States Geological Survey (USGS), which is sponsored by the State and local Groundwater Banking Authority (GBA). There are salt water intrusion type issues all along the western side of this area, and this three-year study is looking to define where it is coming from and how to combat it. Further reports will be issued later this fall.

With the aid of a PowerPoint presentation (filed), Kathryn Gies with West Yost Associates reported that the two main objectives for this report were to establish the site specific groundwater quality in the region and to define the relative sources and contributions of nitrate and salinity. The groundwater regulations in the State are driven by the anti-degradation rule, which states that if degradation is to occur it must be consistent with the maximum benefit of the people to the State, it would not unreasonably affect beneficial uses, and it would not result in water quality that exceeds the applicable objective or the background quality, whichever is higher. She stressed that it is important to understand the background conditions, which is the driver for the first objective in this study. The second purpose of the study is compliance with the anti-degradation policy, which is driven by technology and requires the best practicable treatment and control.

In response to Mayor Pro Tempore Johnson, Ms. Gies explained that background conditions are the existing conditions, or in this case the conditions of the groundwater that would occur whether or not this facility was in place.

In response to Council Member Hansen, Ms. Gies stated that the term "best practicable treatment and technology" defines that it must be both cost effective as well as implementable. Mr. Hansen expressed concern that the State does not appear to be concerned about the cost to cities associated with its mandates. Ms. Gies stated that the difference between groundwater and surface water regulations is that the National Pollutant Discharge Elimination System and the discharge to surface water is driven by Federal regulations including the Clean Water Act; whereas, groundwater is only regulated through the State's anti-degradation policy.

Ms. Gies explained in detail the two main constituents of nitrogen and salinity. Nitrogen can be in organic nitrogen form, which can be found in biological material, and inorganic form, which include ammonia nitrogen and nitrate nitrogen. Organic nitrogen is applied to the soil, and as it slowly breaks down, the proteins mineralize and convert to ammonia. The ammonia, whether it is converted from organic nitrogen or is directly applied, can take three main pathways: it can stick to the soil through absorption and either be taken up by

plants or can be converted to nitrate in a process called nitrification. The nitrate, whether it comes from ammonia or directly land applied, can either be taken up by plants or can be transported into groundwater. Once nitrate gets into the groundwater, it can be transported off-site, which is the concern for this project. Salinity is defined as the dissolved minerals, or salt content, in a body of water. All minerals when dissolved have either a positive or negative charge; therefore, the electrical conductivity (EC) is a measure of the charge and a measure of the salinity content. The major components of EC are calcium, magnesium, sodium, chloride, bicarbonate, and sulfate. Ms. Gies provided a general overview of the ECs of various bodies of water (filed).

There are four primary water quality objectives that are applicable to groundwater: nitrate, EC, sodium, and chloride. The main constituent of concern is nitrate. The water quality objective is 10 milligrams per liter, and studies by the Environmental Protection Agency have shown that concentrations of nitrate higher than that can lead to health concerns. The objectives for the three other constituents are agricultural goals to have the lowest concentration levels possible.

The current wastewater flow at the White Slough facility is 6.3 million gallons a day, which is primarily from the City of Lodi and municipal supply. The City has a state-of-the art wastewater treatment plant with the highest technology that would be considered practicable for a wastewater treatment facility. Lodi began irrigation re-use in the 1940s, which makes it somewhat difficult to define the background condition. There is presently a 790-acre irrigation re-use and biosolids application area that the City relies on for disposal of biosolids, cannery wastewater, and irrigation of municipal water. All of the municipal water comes into the facility in two separate pipelines. During the winter months, the water is treated and discharged into the Delta, and during the summer months, a majority of the water is treated, stored on site, and land applied as irrigation water. The City also has an industrial in-flow line, which is primarily from the cannery, that is brought into the facility and directly land applied. The third major source of water is runoff flows that the City captures from agricultural properties located to the east, as well as some industrial areas in town, which are brought into the facility and land applied. She pointed out that there are some agricultural uses to the east of the site that could be affecting the water quality of the off-site runoff flow.

In response to Mayor Pro Tempore Johnson's question regarding runoff water, Mr. Prima explained that a number of years ago the City determined it would not let any storm water leave its property; therefore, the water was recirculated. Staff has not done a detailed survey as to how large the area is, and he stated that the amount of runoff is variable from year to year. He believed that the farmers in the area may be dealing with agricultural waiver issues, which may have resulted in a reduction in the amount of runoff from their properties. There is a ditch along Thornton Road that traverses the White Slough property and ends up in the slough. Staff is looking at a project that could separate the runoff, by-pass the property, and put it into the ditch. There is also an industrial line, which is an old storm drain, with properties that have catch basins to catch the runoff, and staff is looking at quantifying that as well. The issue is on-site storage problems during certain times of the year.

Ken Loy, Hydrogeologist with West Yost Associates, provided an overview of the environmental setting for the White Slough facility and the regional aspects of any potential groundwater impacts. The major considerations are the pre-development geographical features, the Delta versus alluvial plains bordering the Sierra Nevada, and the land and water use in the area. Information from the California Department of Water Resources (DWR) database shows various kinds of water use over a broad geographic area. He displayed on a map the City-owned land in the central area, the Delta boundary to the west, and the alluvial plain of the Sierra Nevada to the east. There are important differences between those geographical areas from the standpoint of the subsurface conditions and the ultimate fate of nitrogen once it gets into the environment.

In response to Council Member Hansen, Mr. Loy described an alluvial plain and stated that the sediments in that area would typically be fine grained (i.e. silts and sands). He pointed out that the Delta has a much higher organic content than the alluvial plain.

Mr. Loy stated that the salinity of groundwater is higher than surface water and that, in areas without a surface water supply, groundwater is most likely being pumped, which affects how the different constituents make their way into the groundwater and move around, as well as affecting the groundwater flow direction.

Council Member Beckman expressed concern with the accuracy of the maps, particularly the information pertaining to surface water, and questioned if the information came from the Woodbridge Irrigation District (WID). Mr. Loy responded that the map was prepared by DWR; however, it was very likely DWR obtained the information from WID.

Mr. Loy displayed a map of the local wells in order to demonstrate the water use in the immediate vicinity of the facility. Despite the fact that DWR maps it as a surface water area, there is groundwater use in the vicinity, primarily to the northeast. The land use in the area is mostly agricultural, and, in addition to the City-owned land, there are a number of confined animal facilities that are close in proximity, as well as wineries. White Slough and the confined animal facilities generate the same kinds of constituents (i.e. nitrate and salinity) that are applied to the land in a similar way for agricultural use. The generalized groundwater flow directions move to the southeast and the sources are very likely to meld as water moves down the flow paths.

Mayor Pro Tempore Johnson questioned if the waste from local dairies was affecting the City's groundwater quality, to which Mr. Loy stated that whether a particle of nitrate from a local dairy would end up under White Slough or not is unknown; however, it is certain that particles emanating from the various sources are moving in the same southeasterly direction. There may be local pumping that is not apparent on a regional groundwater flow map that would affect the local groundwater flow direction. He added that there is also a vertical component in that groundwater moves down as it moves laterally. There is the issue too of whether nitrate contamination that may originate from a dairy would be detectable in the shallow monitoring well at the City facility because all of the City wells are screened at the water table in accordance with DWR requirements.

In response to Myrna Wetzel's question, Ms. Gies explained that a confined animal facility is where dairy cattle are held in a concentrated area and dairy land application is where manure that is collected is spread over agricultural property.

Mr. Loy presented two regional groundwater elevation contour maps, which are produced on a semi-annual basis by the San Joaquin County Flood Control District: one from fall 1977, which had the lowest groundwater elevations on record, and the other from spring 1983, which had the highest groundwater elevations. The Woodbridge dam has the highest groundwater elevation in the area, which gradually decrease to the lowest groundwater elevation in the Stockton area. The form and shape of the contours on both maps indicate that the flow directions are the same. The flow travels down the fall line and eventually moves toward the area around Stockton, which is persistent with the cone of depression due to the pumping in that area. This is a persistent pattern of a southeasterly flow direction, which is there every year. The groundwater at the White Slough facility moves very slowly at a maximum velocity of ten feet per day and a minimum of less than an inch and moves through the pore spaces in the sands, silts, and clays that make up the aquifer. Mr. Loy showed a map from fall 2003 with the local groundwater elevations, which were based on shallow monitoring wells at the facility and screened at the water table. The map illustrates that the contours have deflected a bit to the northeast and indicates that groundwater flow on a local basis is to the northeast; however, it ultimately curves back around and moves to the southeast, which is where a number of pumping wells are located

and used for irrigation and domestic supply. The salinity levels for the City-owned land in the Delta area is between 500 and 1,000 micromhos per centimeter and is surrounded by areas where the concentration is greater than 1,000 micromhos per centimeter. The USGS study regarding salinity in the Delta area theorizes that the salinity is an artifact of pre-development conditions and that prior to construction of the large water projects the summertime flows in the rivers coming out of the Sierra would have been even less than they are now because there would not be releases from reservoirs. That would have allowed for intrusion of salt water, and in the pre-development period, it happened as far south as Stockton; therefore, seawater was moving into the Delta area farther than it does today. The alluvial plain has a low salinity and does not have the Delta influence, but the White Slough facility sits very near the boundary where there is a strong Delta influence and a naturally elevated salinity. It appears that the higher salinity has formed a fringe around the perimeter of the Delta and that the small isolated area near the facility may be a remnant of that fringe; however, the data is based on samples from a few wells.

In response to Mayor Pro Tempore Johnson, Mr. Loy confirmed that the information is 25 years old, but he believed the State was utilizing the same data in its decision-making process. Mr. Johnson reiterated his concern regarding the potential impacts to the facility from the agricultural neighbors to the southeast, many of which were in existence 20 to 25 years ago. Mr. Loy believed that this was an affect of the millennial type of changes that have occurred subsequent to the construction of the projects.

Mr. Prima clarified that the State has asked the City to investigate and it received this report at the same time Council did; however, it has yet to respond. He believed the City made a worthy case that there are a number of background conditions in the area that have nothing to do with White Slough.

Mr. Loy stated that there is further data from the 1981 USGS study that indicates there is an association between high salinity and high chloride. Chloride is clearly associated with seawater, and one of the interesting findings is that there are high chloride values along the eastern margin of the Delta in the fringe area, which extends to the county line and to the Stockton area. That is evidence that these water quality characteristics were foundational and there before man started using groundwater, which is a pre-existing condition. Studies are looking at overprints on the water quality that are attributable to one source or another.

Mr. Loy presented a figure showing the locations where nitrate concentrations have been measured in supply and test wells installed for new development. The standard for nitrate for health and drinking water quality is 45 milligrams per liter. There is a cluster of higher concentrations to the northeast of the facility. The City's supply well that was recently sampled had a concentration of 4 milligrams per liter.

In response to Council Member Hansen, Mr. Loy stated that the flow pattern was there before the plant was built and, although it might be modified somewhat by the presence of the plant because water is being applied to the land surface that will percolate to the water table, he would characterize that as an overprint on the pre-existing flow direction. Mr. Hansen stated that the City has been contacted by a farmer who is very concerned about the nitrate levels and the affect on his crops and he attributes it to the City's sewage treatment plant. Mr. Prima stated that, based on the flow paths, staff feels it is unlikely the City is having an impact on his property. Mr. Loy added that the direction nitrate moves is dependent on the groundwater flow direction, and if it is not moving toward this property, the facility would not be the source.

Mayor Hitchcock questioned what direction the flow is to the west of Interstate 5, to which Mr. Loy stated he did not have the mapping to answer that question; however, he pointed out that the velocities are just as important as the direction in the Delta boundary. The properties of the soil are such that, regardless of the gradient, the movement of the groundwater is greatly impeded because of its low permeability due to the silts, clays, and

fine grain materials. There is most likely an easterly flow, but most of the water coming into the Stockton area that is recharging around its pumping wells is presumably coming from the Sierra because of the permeability. Mr. Prima added that it is further complicated by the fact that much of the land in the Delta is either at or below sea level. In regard to the Mayor's question regarding salt water intrusion, Mr. Loy stated that the groundwater quality in Lodi and Stockton are similar in terms of salinity and the values are a fraction of the salinity in the groundwater in the Delta area. Despite the fact that there is a strong indication that some groundwater moves from the Delta to Stockton, the permeability is so low underneath the Delta region that the groundwater with the high salinity does not move. Mr. Loy reported on the nitrate conditions in shallow monitoring wells near the plant. The water quality standard for nitrogen is 10 milligrams per liter, and to the west in the Delta lands, the nitrate is below the water quality standard. The land in that area is at a higher groundwater elevation, and the groundwater is flowing to the east and southeast. The soil in the Delta has the ability to buffer the groundwater from impacts due to the nitrate, so there is a denitrification that occurs that causes the nitrate to mineralize to inorganic species. There is clearly an impact at this facility as the nitrate concentrations are above the water quality standards. This data is from shallow monitoring wells; however, the deeper supply well on the property has a concentration of 4 milligrams per liter, which is below the water quality standard. The indication is that these elevated concentrations near the facility and the associated land application areas are representative of local conditions. In looking at the big picture, there are many sources co-mingling as they move along the groundwater flow paths that are affecting the water quality.

In response to Council Member Hansen, Mr. Loy stated that the uncertainty is over the contribution of the other sources and the ultimate fate of the nitrate. Mr. Prima answered that the supply well is 150 to 200 feet deep. From a regulatory standard, the current expired permit states the City cannot have impacts off of the property, and the high concentration on that supply well is not the problem. The concern is on the well at the edge of the property on Thornton Road, which is showing high levels that staff presumes has gone off site in the shallow groundwater.

In response to Mayor Pro Tempore Johnson, Mr. Prima stated that the State is currently processing the City's permit and it appears it will be separated into two permits: one for discharge, which falls under the Clean Water Act and Federal rules, the other for land application, which is handled by the Regional Board.

Mr. Prima reported that staff is looking at installing additional monitoring wells, which is subject to negotiation with the Regional Board and the USGS. The industrial line had a worn out section of pipe due to an old valve that was partially closed, which caused erosion in the pipe and has since been corrected. The municipal sewerage has problems with corrosion from hydrogen sulfide, and staff has repaired one section. It is possible that some of the high concentration of nitrate could have come from the pipeline.

Ms. Gies reported that the concentration of salinity in the northwest of the wastewater treatment plant is higher than those in the deeper wells. The municipal effluent is half that concentration, and the industrial and cannery water has a high salinity. In regard to land application, all of these waters are blended together before they are land applied; therefore, the irrigation water that is applied to land is half of the salinity of the background wells. The storage pond is even lower, due to the fact that the cannery water does not go into the ponds. The City's municipal groundwater supply is half of the municipal effluent, which is common in municipal systems. She pointed out that the Mokelumne River supply is even lower, and if that is brought into the City's water supply, all of the salinity levels would reduce. Despite the fact that the storage pond salinity is lower than the regional trend, total nitrogen is elevated. There are two options to deal with the issue: line the ponds with a geomembrane liner or reduce the loading of nitrogen to the ponds. Three primary sources of nitrogen were identified, two of which are being removed in the 2007 upgrade, with a potential of the third source being removed. This approach is the most cost effective and

practicable for the storage pond. With respect to the irrigation re-use area, the salinity is much lower than regional trends, and there is no strong correlation between the land application of nitrogen and that in the wells. Reasons for that include the depth of the groundwater, the nitrogen transformations, other sources of nitrogen, and the distribution of the nitrogen. It is difficult to pinpoint exactly where it is coming from and how it changes as it moves in the soil. It is necessary to implement additional nitrogen controls, and staff is working to develop site specific loading rates for the land application site. The 2007 upgrade will include an effluent nitrate reduction and supernatant treatment to reduce the total nitrogen that is being land applied. In addition, staff will analyze the benefits of expanding the irrigation area in order to spread the nitrate and reduce the loading rate on the land, alternatives for biosolids treatment, and improving the irrigation water distribution to spread it more evenly.

In summary, Ms. Gies stated that further investigation is necessary to identify the background conditions and the influence between the City's treatment plant and other sources. Staff is currently implementing source control measures and the next step is a detailed cost benefit analysis. The program will be separated into groundwater monitoring and evaluation (i.e. finalize monitoring well, install background wells, hydro punch testing, etc.) and source control (i.e. finalize site specific loading rates, evaluate future loading conditions, etc.). At the conclusion, a report will be prepared identifying those recommendations for controls, followed by implementation. Following the necessary improvements, monitoring, and characterization reports, if it is determined that the City's practices are not causing groundwater impacts, the study would be complete; otherwise, the City would look to further source control efforts and alternatives beyond this study.

Council Member Hansen questioned how the potential new gas turbine plant would impact the facility, to which Mr. Prima stated that it has not been considered to date due to the uncertainty of the project. He pointed out that the City is willing to provide water to the plant; however, it does not want it back because its cooling process would raise the salinity level considerably. The turbine plant would be a zero discharge facility and would need space for lined, evaporative ponds.

In response to Mayor Pro Tempore Johnson, Mr. Prima stated that the overall study was budgeted at \$300,000, and less than half has been expended thus far. The USGS expressed an interest in drilling a deep monitoring well if the City were willing to pay for it, and Mr. Prima explained this was in conjunction with the GBA and was not unprecedented for agencies to chip in to get extra data from a well.

In response to Mayor Hitchcock, Mr. Prima stated that the City's permit expired in January 2005, but it was administratively extended.

In response to Council Member Mounce, Mr. Prima stated that the application fee for the permit is \$10,000 and he was unsure as to whether or not there would be a fee for each permit, if it were to be separated. He added that the annual fee is \$45,000.

Mayor Hitchcock questioned if the City was still considering purchasing additional land near White Slough, to which Mr. Prima responded that it was unsure at this point whether or not it was necessary. The past assumption was that the City would discharge in the winter and land apply in the summer due to the discharge standards; however, the last five to seven years has proven this to be a non-issue. Long-term discussions have focused on the fact that the water is being treated to such a high standard that it ought to be re-used elsewhere, and there are issues with the potential sites around the facility.

Mr. King opined that the main issue is what the future holds for treatment methodology for land application of treated water, which should be considered as part of any investment in a wastewater treatment plant, particularly if it has a 20 to 30 year debt repayment.

Mayor Hitchcock stressed that the City needs to keep its options open to account for any new regulations. Mr. Prima added that the cannery has been working with the City and has switched from sodium hydroxide peeling operations to a potassium hydroxide, which is much better for land application and has less impact on the soil.

C. COMMENTS BY THE PUBLIC ON NON-AGENDA ITEMS

None.

D. ADJOURNMENT

No action was taken by the City Council. The meeting was adjourned at 8:40 a.m.

ATTEST:

Jennifer M. Perrin
Interim City Clerk



**CITY OF LODI
COUNCIL COMMUNICATION**

AGENDA TITLE: White Slough Water Pollution Control Facility Groundwater Report and Improvement Project Update

MEETING DATE: October 3, 2006 (Shirtsleeve Session)


PREPARED BY: Public Works Director

RECOMMENDED ACTION: That the City Council receive the White Slough Water Pollution Control Facility groundwater report and improvement project update.

BACKGROUND INFORMATION: Staff and the City's wastewater consultants, West Yost & Associates, will provide an overview of the recently released Groundwater investigation Report. In addition, a brief overview of the planned 2007 improvements to the White Slough Facility will be provided. We will also have some limited information as to what we anticipate we will see in our next discharge permit. The permit is still being drafted, and at this point, we do not have a time frame in which we will see the new permit.

FISCAL IMPACT: Not applicable at this time

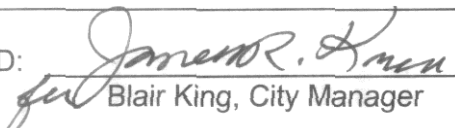
FUNDING AVAILABLE: Not applicable.

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Richard C. Prima, Jr.
Public Works Director

RCP/pmf

cc Bruce West, West Yost & Associates
Wally Sandelin, City Engineer/Deputy Public Works Director
Del Kerlin, Wastewater Treatment Superintendent

APPROVED:


Blair King, City Manager

CITY OF LODI WATER POLLUTION CONTROL FACILITY GROUNDWATER INVESTIGATION *Existing Conditions Report*



October 3, 2006

Purpose and Objectives

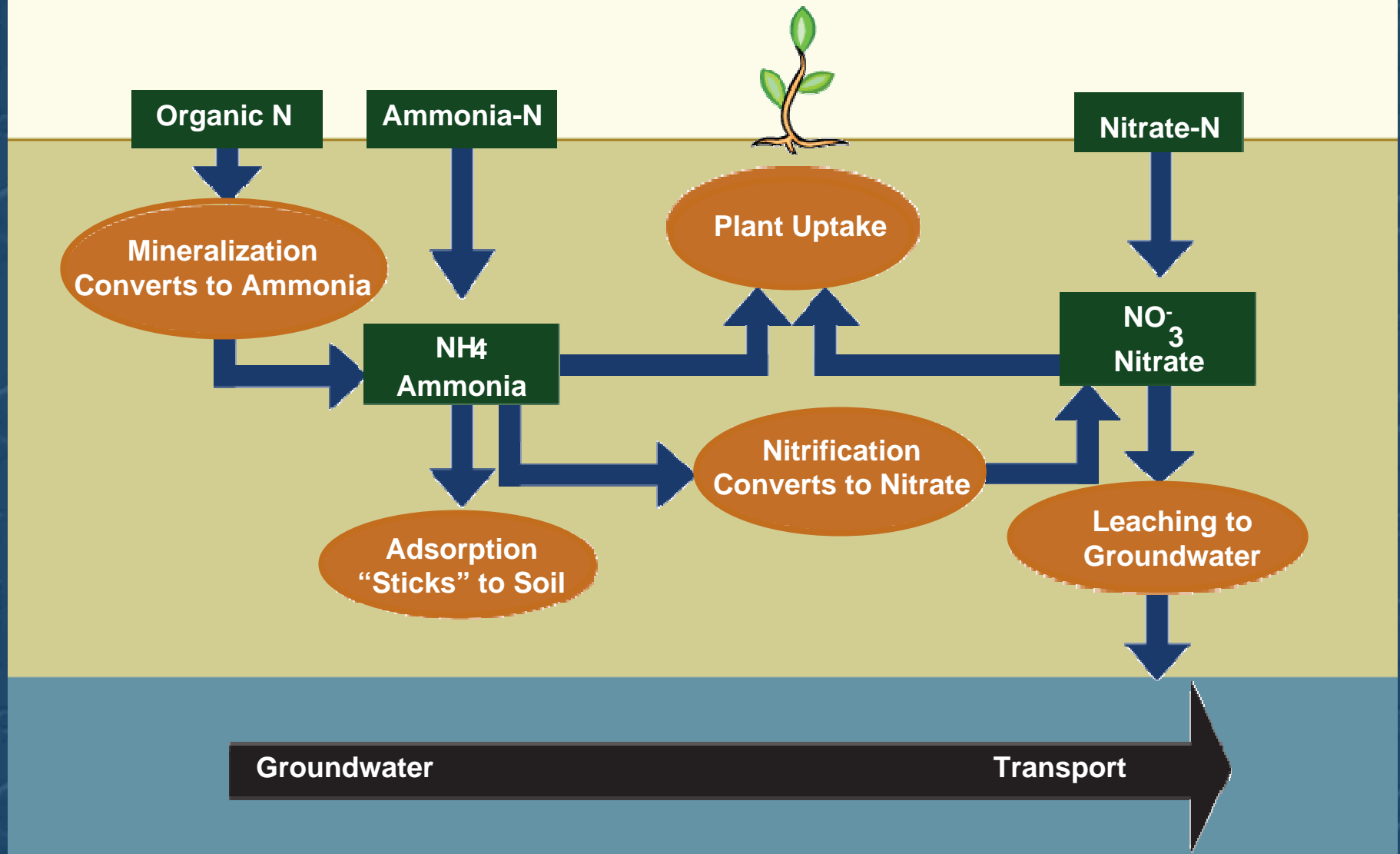
- ▶ Establish Existing Regional and Site-Specific Groundwater Quality Conditions
- ▶ Identify Sources and Relative Contributions of Nitrate and Salinity



Overview of California Groundwater Protection Policies

- ▶ Anti-degradation Policy Requires that Any Change in Water Quality:
 - Is consistent with “maximum benefit to the people of the State”
 - Will not unreasonably affect beneficial uses; and
 - Will not result in water quality that exceeds the applicable objectives or background water quality, whichever is greater.
- ▶ Dependant Upon Background Conditions
- ▶ Compliance is Technology Driven and Requires Best Practicable Treatment or Controls (BPTCs)

THE SOIL NITROGEN CYCLE



Salinity

- ▶ Salinity is the Dissolved Mineral (or Salt) Content of a Body of Water
- ▶ Minerals Dissolved in Water Have a Positive or Negative Charge
- ▶ Electrical Conductivity (EC) is a Measure of This Charge (and Therefore is a Measure of the Dissolved Mineral Content)
- ▶ Major Components of EC are Calcium, Magnesium, Sodium, Bicarbonate, Chloride, and Sulfate

EC Content of Water Bodies

Body of Water	Typical EC, $\mu\text{mhos/cm}$
Distilled Water	3
Pure Rainwater	10
Lake Tahoe	90
Sacramento River	150
San Joaquin River	500
Western Delta Water (Brackish)	2,000
Pacific Ocean	>40,000
Great Salt Lake	158,000

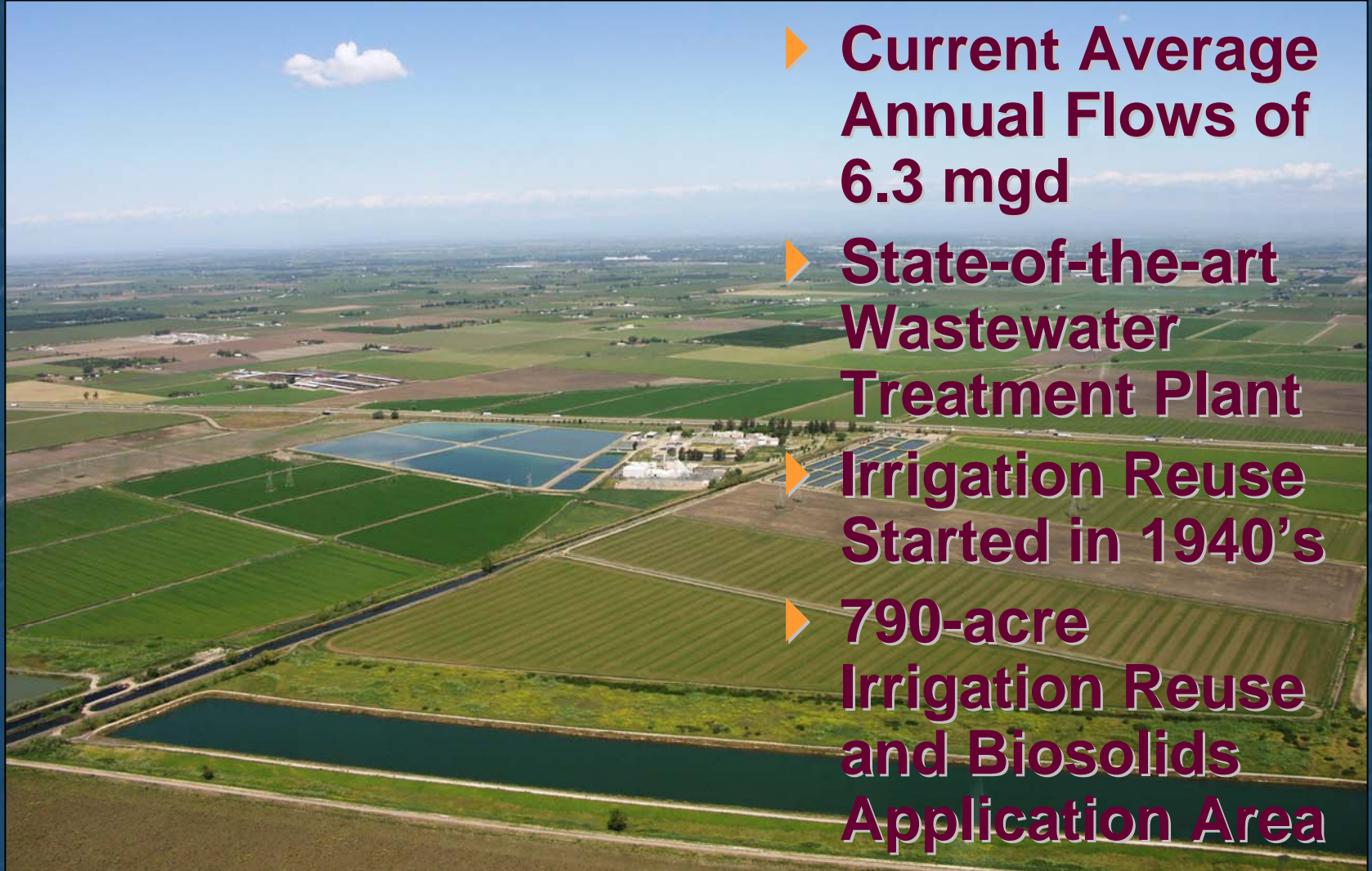
Water Quality Objectives for Groundwater

Constituent	Concentration	Applicable Objective
Nitrate	10 mg/L	Primary MCL
EC	700 μ mhos/cm	Agricultural Goal
Sodium	69 mg/L	Agricultural Goal
Chloride	106 mg/L	Agricultural Goal

Facilities Overview

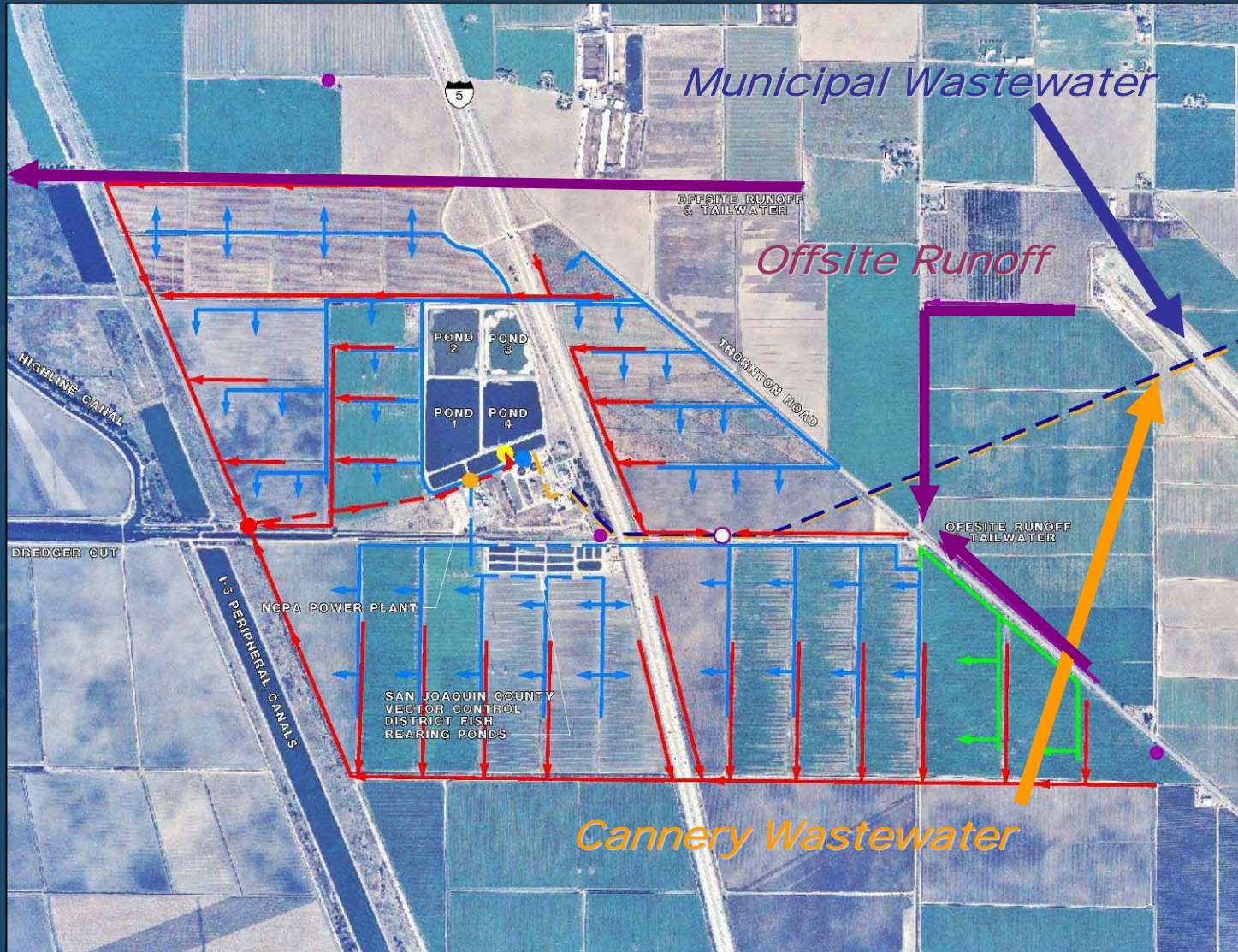


City of Lodi WPCF



- ▶ **Current Average Annual Flows of 6.3 mgd**
- ▶ **State-of-the-art Wastewater Treatment Plant**
- ▶ **Irrigation Reuse Started in 1940's**
- ▶ **790-acre Irrigation Reuse and Biosolids Application Area**

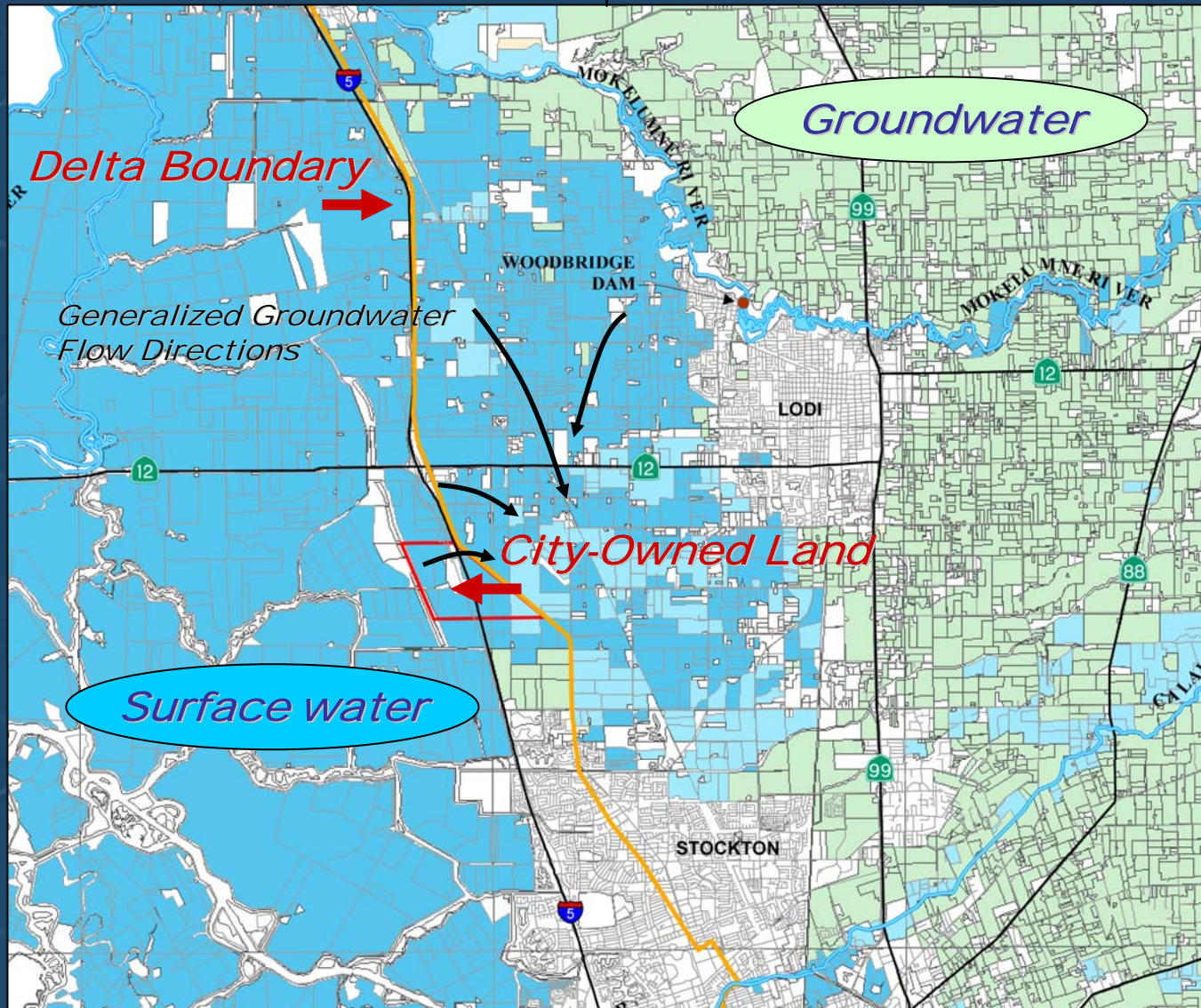
WPCF Irrigation Reuse Facilities



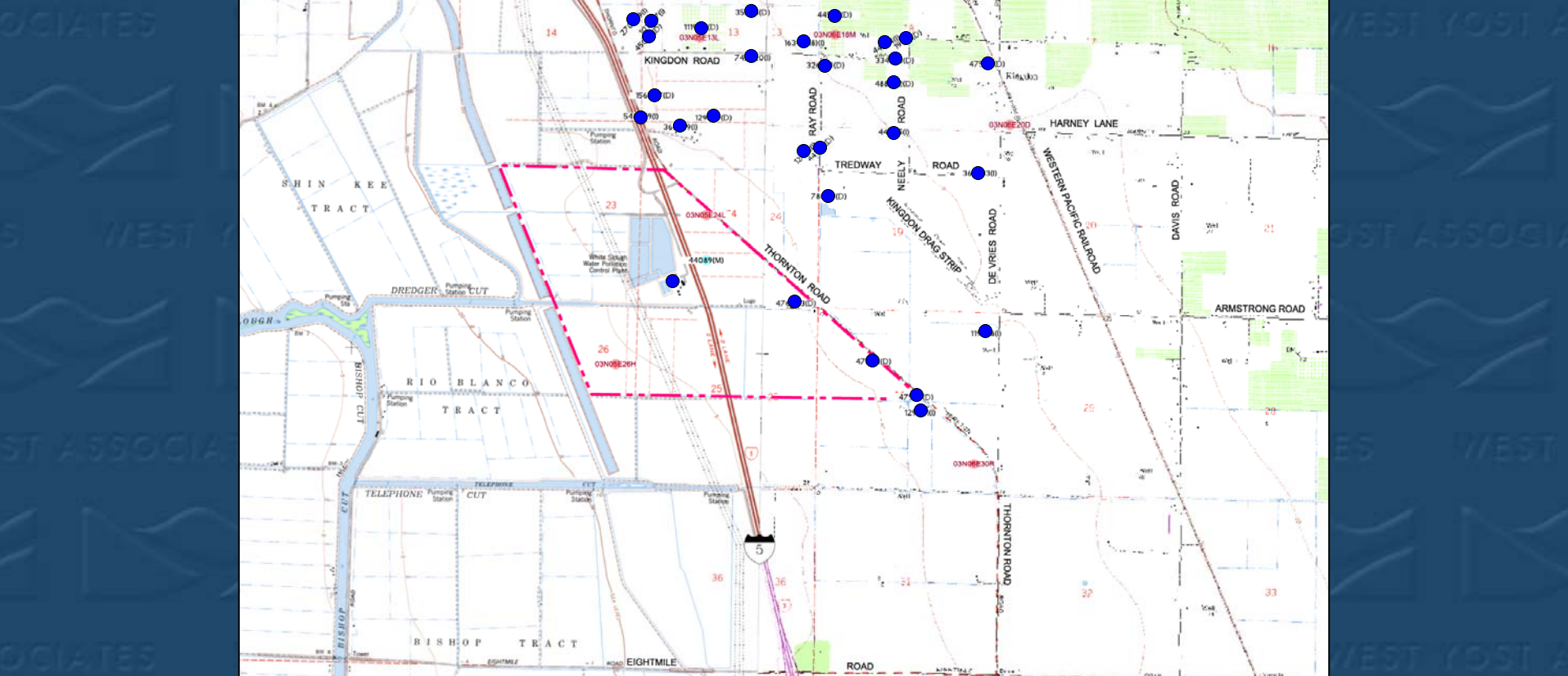
Environmental Setting



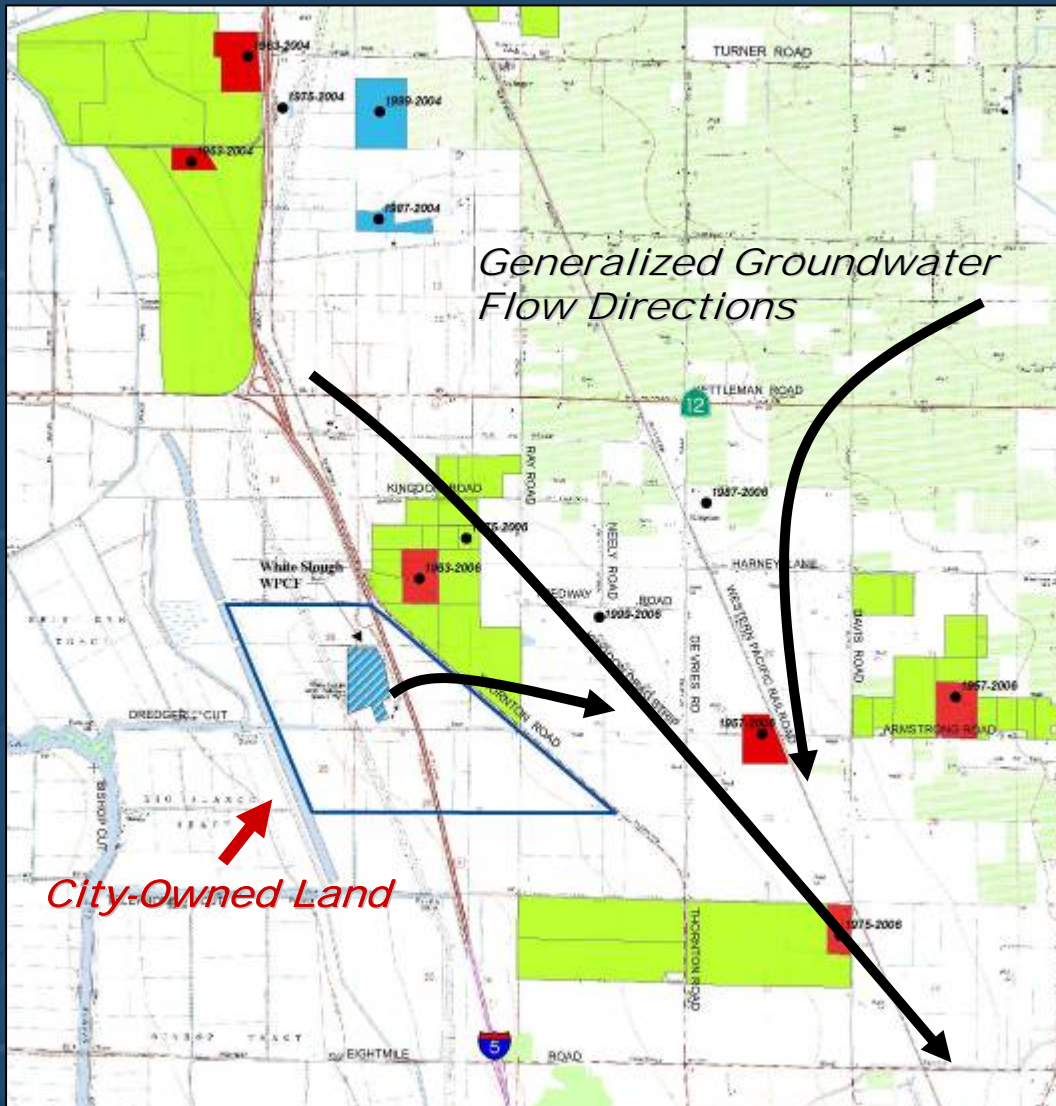
Water Use



Supply well Location Map



Land Use



LEGEND



Confined Animal Facility

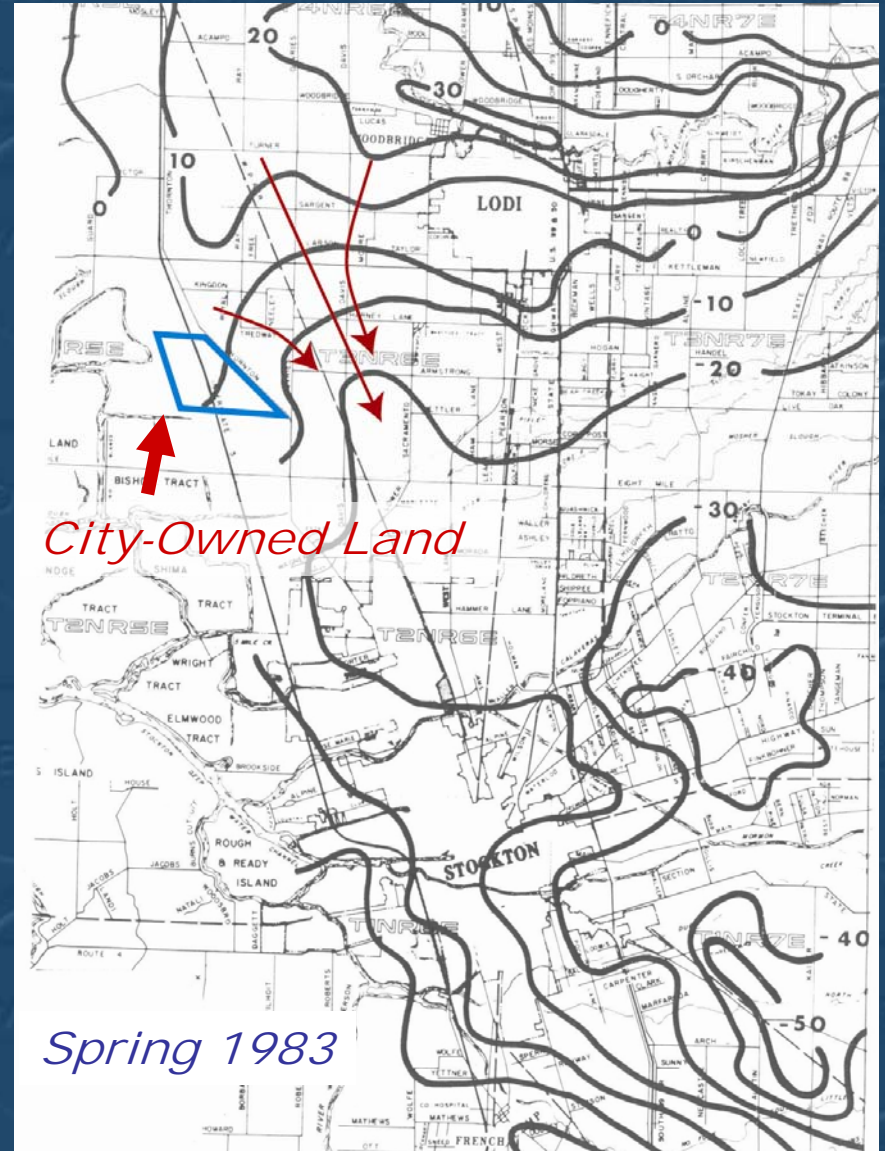
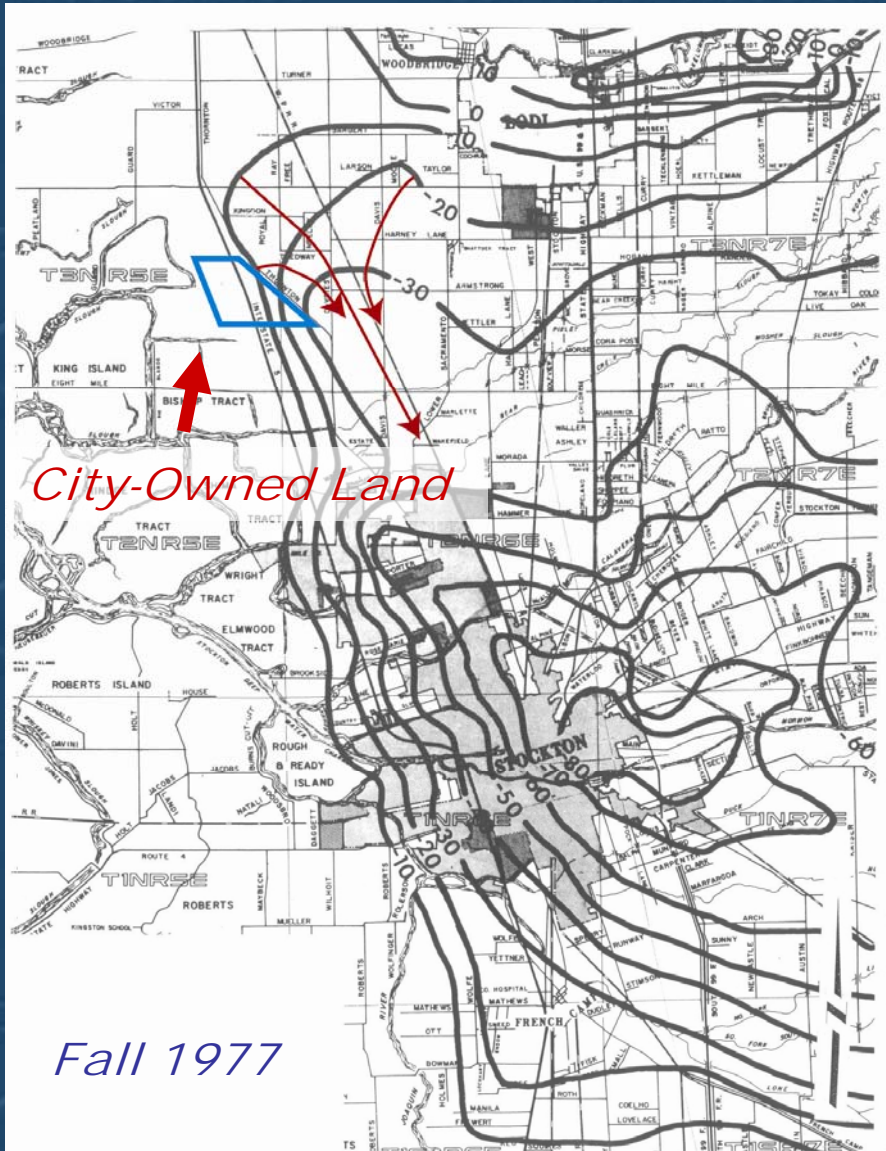


Dairy Land Application



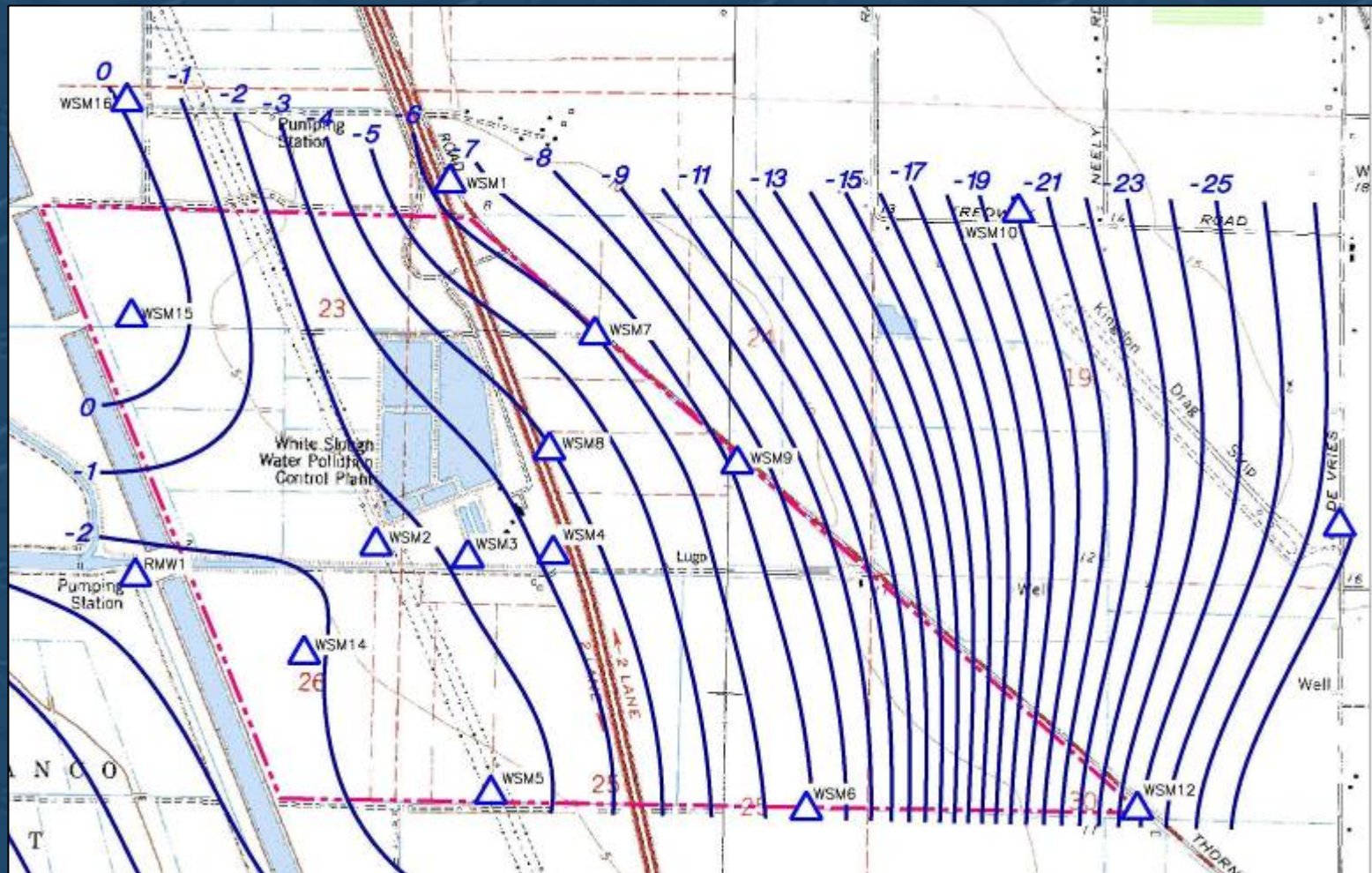
Winery Waste Treatment

Regional Groundwater Gradient



Local Groundwater Flow: Fall 2003

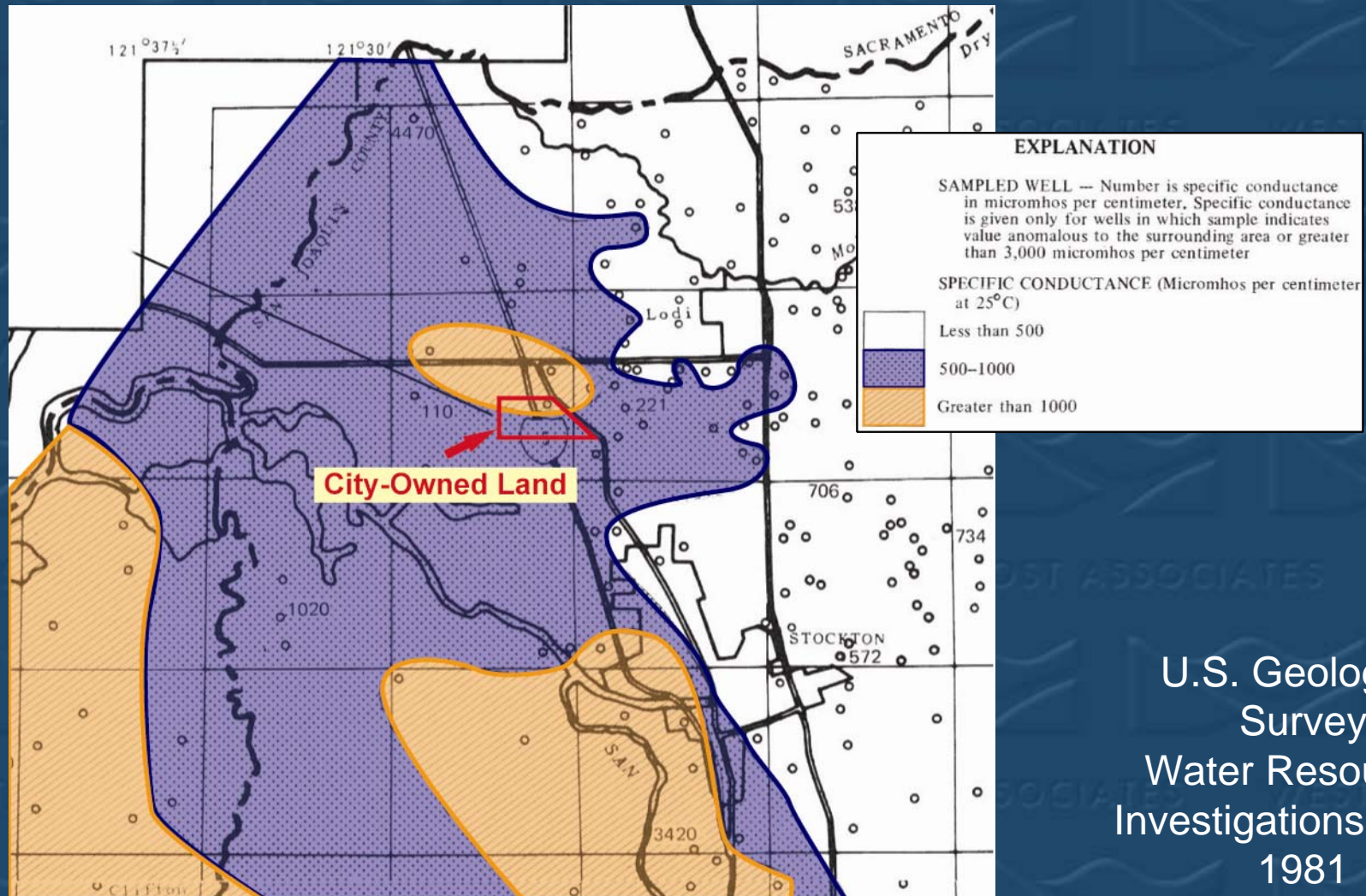
(Measured in Shallow Monitoring Wells)



Groundwater Quality

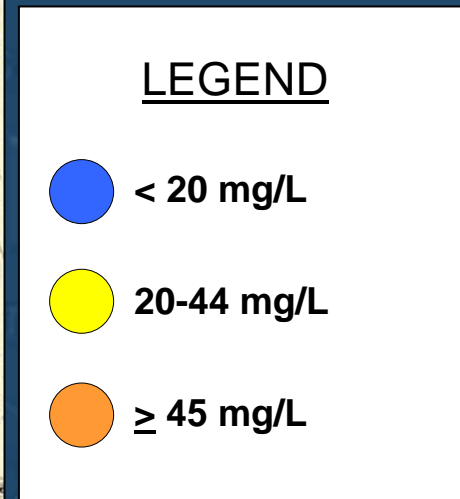


Regional EC Trends (Measured in Supply Wells)



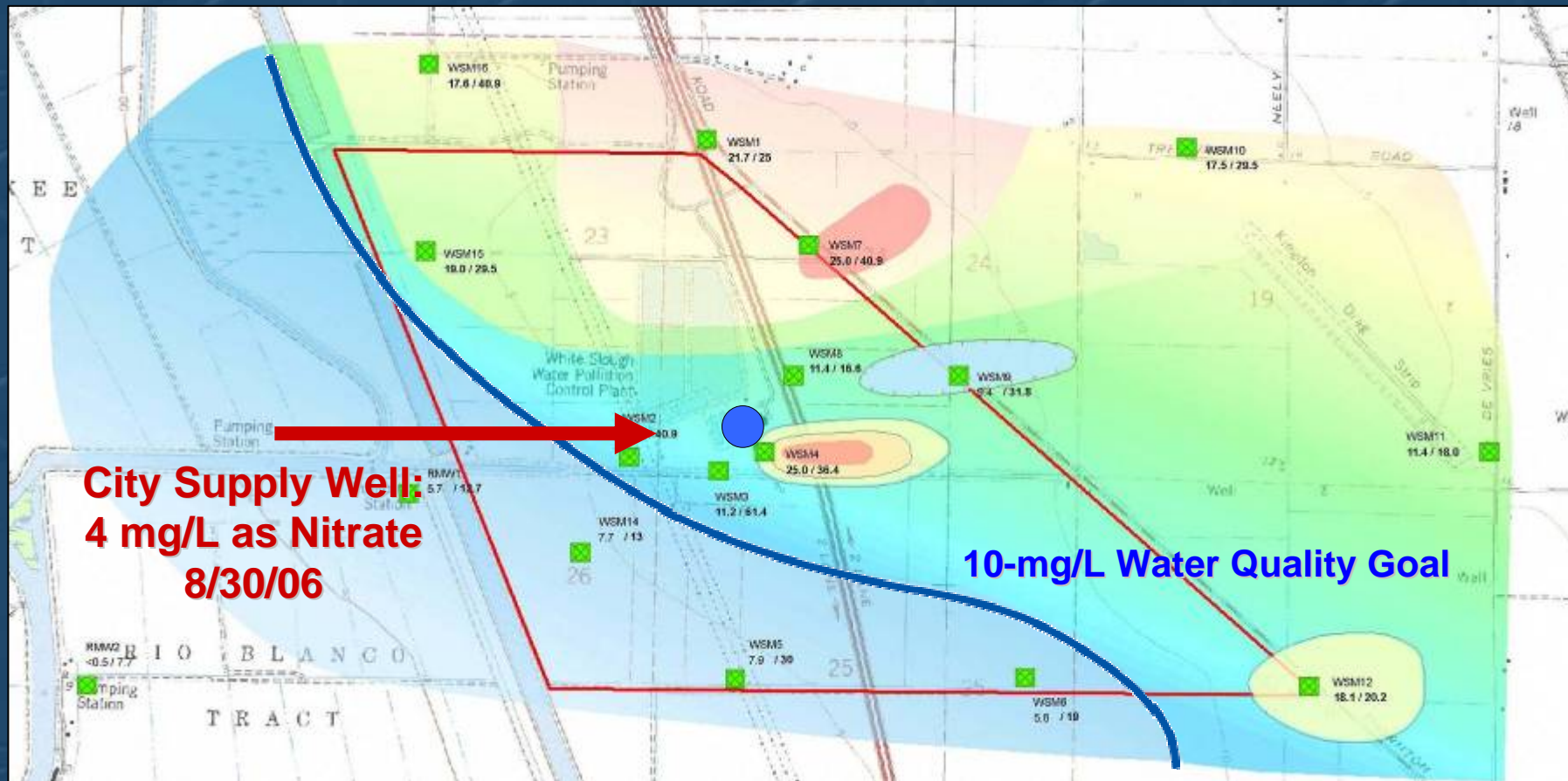
**Base Map and
Nitrate Data
Provided by:

San Joaquin
County
Department of
Environmental
Health**

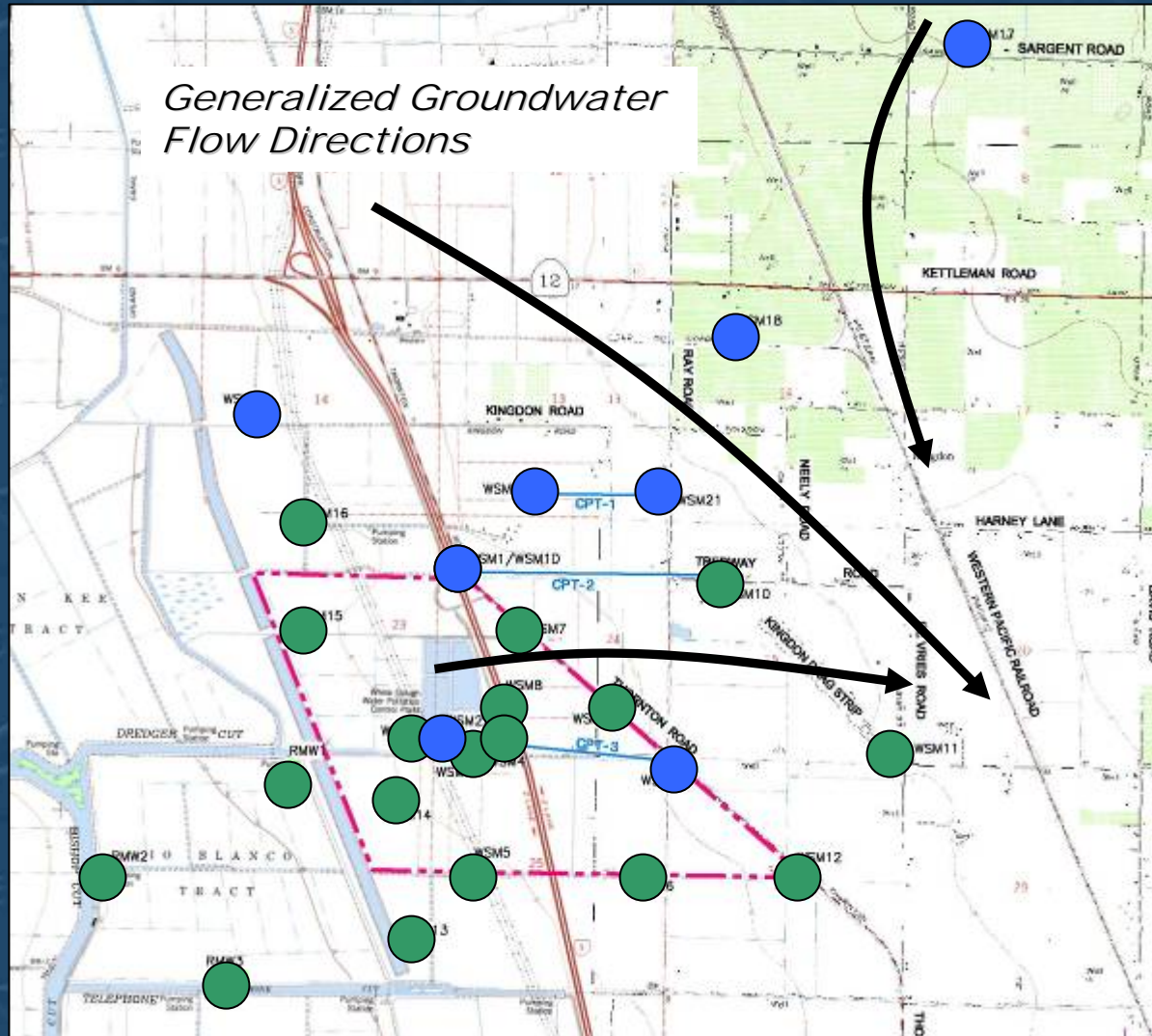


On-Site Nitrate Trends

(Measured in Shallow Monitoring Wells)



Groundwater Monitoring Network



Potential WPCF Sources of Groundwater Degradation

- ▶ Influent Municipal and Industrial Sewers
- ▶ Storage Ponds
- ▶ Irrigation Reuse Area



Influent Sewers

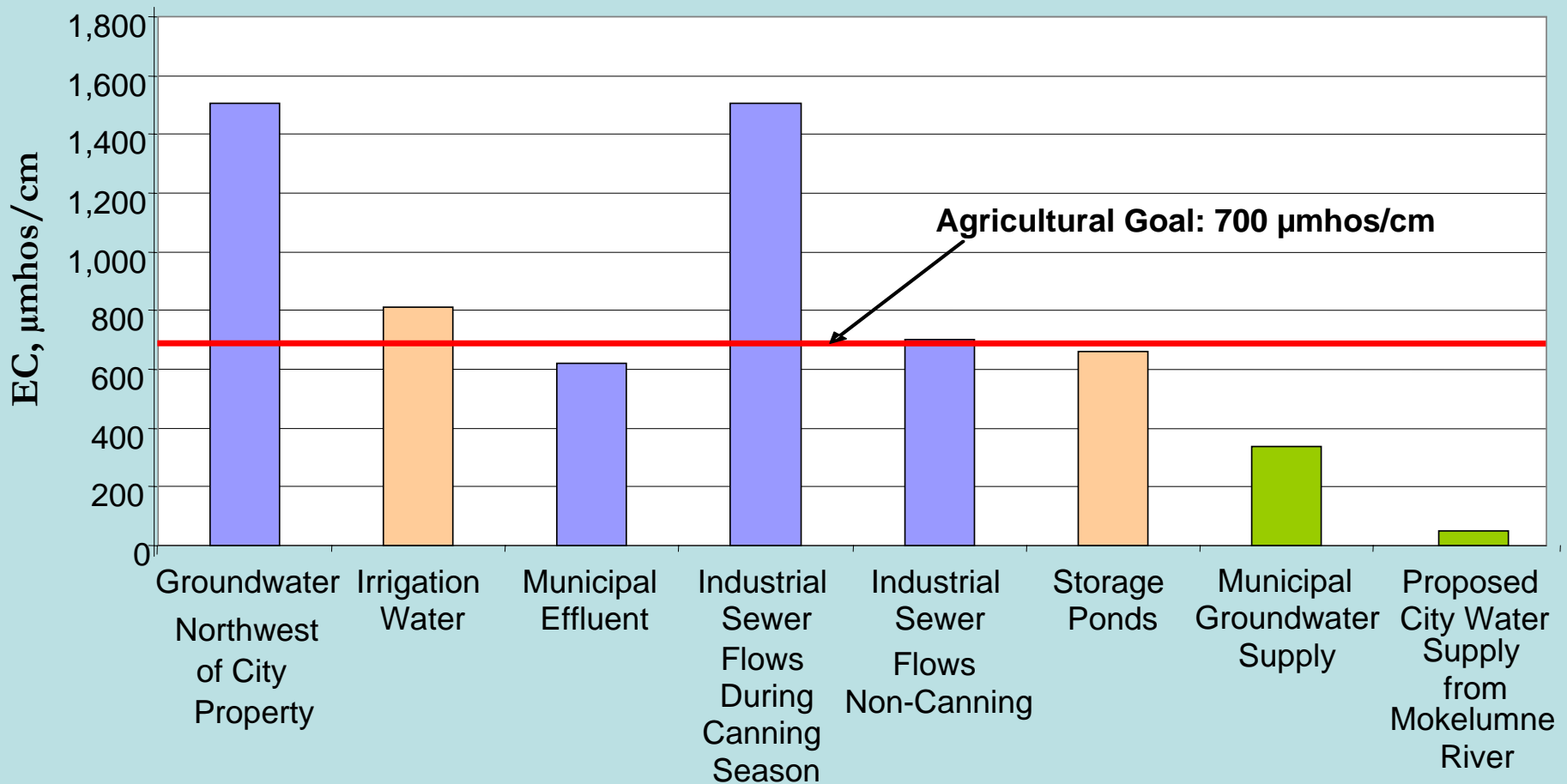
▶ Industrial Sewer

- Cannery Flows Have Elevated Salinity
- Erosion Damage Identified At One Location on Eastern WPCF Property
- Repaired in 2001

▶ Municipal Sewer

- Municipal Flows Have Elevated Nitrogen
- Corrosion Damage Identified During Current WPCF Upgrade
- Some Repairs Have Been Made
- Additional Repairs Planned for Entire Line

Average Electrical Conductivities At WPCF



Storage Ponds

- ▶ Salinity is Much Lower than Regional Trends
- ▶ Total Nitrogen is Elevated
- ▶ *Either* Line Ponds with Geomembrane Liner – Very Expensive
- ▶ Or Reduce Pond Nitrogen Loadings:
 - Supernatant Flows to Municipal Treatment Facility (Included in 2007 Upgrade)
 - Provide Denitrification for Municipal Flows (Included in 2007 Upgrade)
 - Eliminate Discharge of Runoff Flows to Ponds (Potential Addition to 2007 Upgrade)

Irrigation Reuse Area

- ▶ Salinity is Lower than Regional Trends
- ▶ No Strong Correlation Between Nitrogen Loading and Groundwater Nitrate
- ▶ Other Factors Must Be Considered
 - Depth to Groundwater
 - Nitrogen Transformations in Soil and Groundwater
 - Other Sources of Nitrogen
 - Spatial and Temporal Distribution of Sources
- ▶ Options for Additional Nitrogen Controls:
 - Adjust Loads to Meet Site-Specific Uptake
 - If Necessary, Modify Facilities for Better Distribution

Potential Irrigation Reuse Area Nitrogen Load Reduction Strategies

- ▶ 2007 Upgrade
 - Effluent Nitrate Reduction
 - Supernatant Treatment
- ▶ Potential Additional Controls
 - Expand Irrigation Area
 - Alternative Biosolids Treatment and/or Disposal
 - Improve Irrigation Water Distribution

Summary and Conclusions

- ▶ Groundwater is Strongly Influenced by Regional Conditions
- ▶ Further Investigation is Needed To Confirm Background Concentrations
- ▶ Some Source Controls Are Being Implemented
- ▶ Detailed Cost/Benefit Evaluation of Additional Controls is Recommended Next Step
- ▶ Evaluation Should Account for Planned Load Changes

Groundwater Monitoring and Evaluation

2006
to
Early
2007

Finalize Monitoring Plan
Install Background
Monitoring Wells
CPT/Hydropunch Testing
Install Source
Characterization
Monitoring Wells

12 Months of
Groundwater
Monitoring

**Complete Groundwater
Characterization and
Background Assessment**

2007
to
2008

Are
the City's
Practices Causing
Groundwater Impacts?

Source Control

Develop Site-Specific
Field Loading Rates
Evaluate Current and
Future Loads
Identify Preferred
Alternatives for Meeting
Loading Requirements

Currently Planned Improvements:

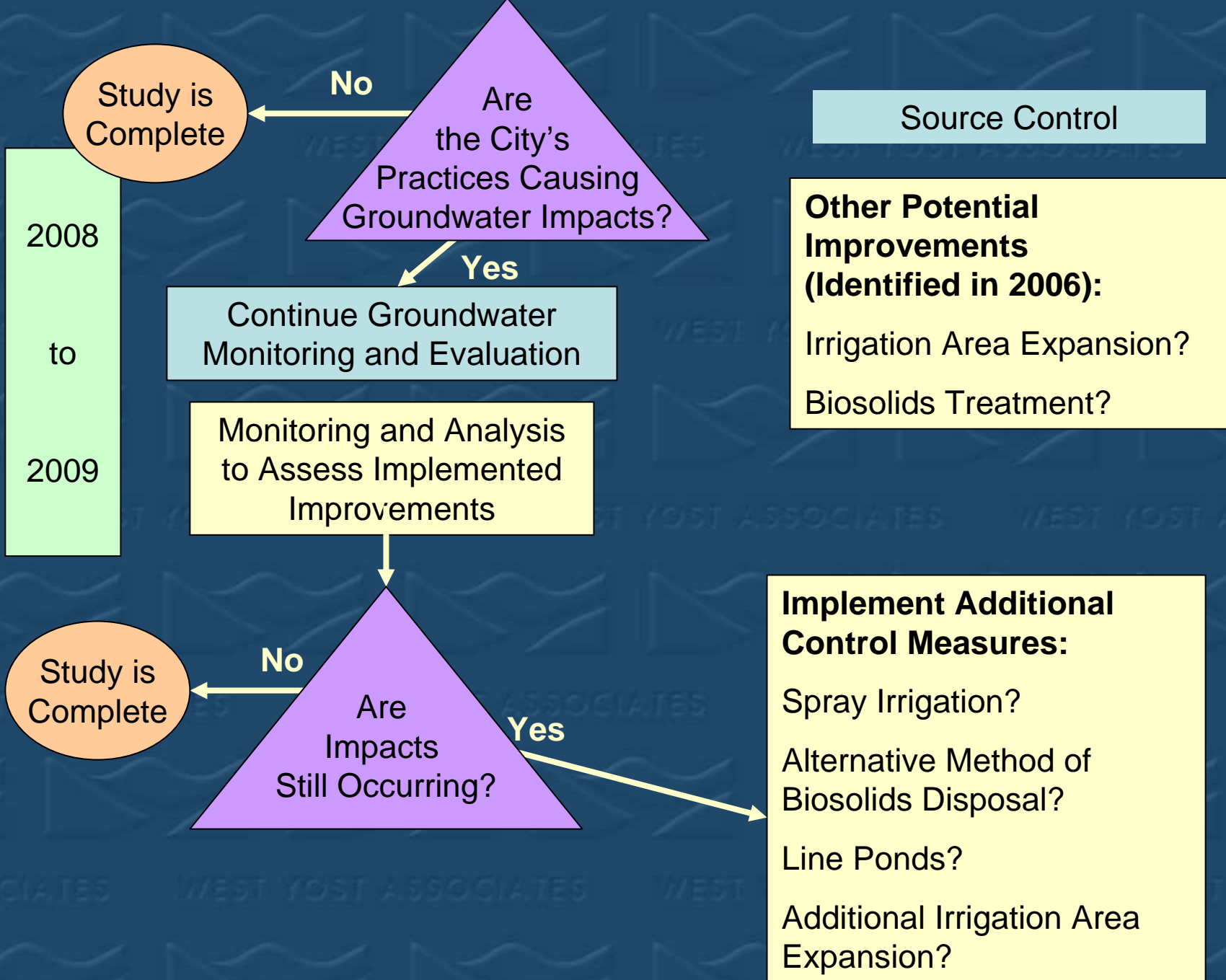
Influent Sewer Repair
Supernatant Return
Denitrification

Anticipated Additional Improvements:

Runoff Flow Changes
Pond Improvements

Implement
Recommended
Improvements

Others?



Current WPCF Expansion Project

- ▶ Influent Screening and Pumping Improvements/Expansion
- ▶ Expansion of Secondary Treatment Capacity (Aeration Basins and Clarifiers)
- ▶ Improved Nitrogen Removal
- ▶ Expansion & Improvements for Solids Treatment Facilities
- ▶ Expanded WPCF Will Have Capacity to Treat Up to 8.5 Million Gallons Per Day (Anticipated 2020 Flows)
- ▶ Anticipated Construction Cost - \$23 million
- ▶ Anticipated Construction Period – April 07 to Dec 08

Upcoming Permit

- ▶ No Date Set for New Permit
- ▶ Requesting Discharge of Up to 8.5 Million Gallons per Day
- ▶ Several Site-Specific Studies Are Expected To Be Necessary
- ▶ Potential Additional WPCF Improvements Needed for Meeting Future Ammonia Requirements

An aerial photograph showing a large-scale agricultural landscape. A multi-lane highway runs diagonally from the top center towards the bottom right. To the left of the highway, a wastewater treatment plant is visible, featuring several large, rectangular, green-colored ponds and a central building complex. The surrounding area is divided into numerous rectangular agricultural fields, some of which are green, indicating active crops, while others are brown or tan, suggesting fallow or harvested land. The word "Questions?" is overlaid in a large, yellow, sans-serif font across the center of the image.

Questions?